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Solvent; dry-cleaning
(Stoddard Solvent)

U. S. DEPARTMENT OF COMMERCE

HARRY L. HOPKINS, Secretary

NATIONAL BUREAU OF STANDARDS

LYMAN J. BRIGGS, Director

STODDARD SOLVENT

(Third Edition)

COMMERCIAL STANDARD CS3-40

Supersedes CS3-38

Effective Date for New Production from June 20, 1940



A RECORDED VOLUNTARY
STANDARD OF THE TRADE

UNITED STATES
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WASHINGTON : 1940

P R O M U L G A T I O N
of
COMMERCIAL STANDARD CS3-40
for
STODDARD SOLVENT
(Third Edition)

On December 2, 1927, at the instance of the National Association of Dyers and Cleaners, a general conference of manufacturers, distributors, and users of Stoddard solvent adopted a recommended commercial standard, which was later accepted by the industry and became effective March 1, 1928. The success of the standard and improvements in manufacturing processes during succeeding years led the standing committee to recommend a revision which was accepted by those concerned and promulgated as CS3-38. On April 19, 1940, a second revision, to incorporate certain refinements of test methods recommended by the standing committee, was circulated for acceptance. Those concerned have since accepted the revision as shown herein for promulgation by the United States Department of Commerce, through the National Bureau of Standards.

The standard is effective for new production from June 20, 1940.

Promulgation recommended.

I. J. Fairchild,
Chief, Division of Trade Standards.

Promulgated.

Lyman J. Briggs,
Director, National Bureau of Standards.

Promulgation approved.

Harry L. Hopkins,
Secretary of Commerce.

STODDARD SOLVENT

(Dry Cleaning)

(Third Edition)

COMMERCIAL STANDARD CS3-40

PURPOSE

1. The purpose of this commercial standard is to provide a nationally recognized specification for guidance of producers, distributors, and users of dry-cleaning fluid known as Stoddard solvent, and to provide a basis for certification of quality.

SCOPE

2. This commercial standard covers physical and chemical properties, methods of testing, and certification of a grade of petroleum distillate of low flammability used in dry cleaning.

GENERAL REQUIREMENTS

3. *Material*.—Stoddard solvent shall be a petroleum distillate conforming to the requirements given herein.

4. *Appearance* shall be clear and free from suspended matter and undissolved water.

5. *Color* shall be water-white or not darker than 21 by Saybolt chromometer. (21 Saybolt color is the equivalent of a freshly prepared solution of potassium bichromate in distilled water, containing 0.0048 g of $K_2Cr_2O_7$ per liter.)

6. *Odor*.—Solvent shall be free from rancid and objectionable odors; shall be typical of a "sweet" refined naphtha.

7. *Corrosive properties*.—A clean copper strip shall show not more than extremely slight discoloration when submerged in the solvent for 3 hours at 212° F. (See par. 18.)

8. *Doctor test*.—A negative result shall be obtained by testing according to paragraph 19.

9. *Sulfuric acid absorption test*.—Not more than 5 percent of the solvent shall be absorbed by concentrated "cp" sulfuric acid (93.2 \pm 0.3-percent concentration by titration) when tested in accordance with paragraph 20.

10. *Flash point*.—The flash point shall be not lower than 100° F when tested in accordance with paragraph 21.

11. *Distillation*.

11a. *Distillation range*.—When a sample is distilled in accordance with paragraph 22, not less than 50 percent shall be recovered in the receiver when the thermometer reads 350° F and not less than 90 percent when the thermometer reads 375° F. The end point (maximum distillation temperature) shall be not higher than 410° F.

11b. *Residue.*—When a sample is distilled in accordance with paragraph 22, the residue shall be not more than 1.5 percent.

12. *Acidity.*—The residue remaining in the flask after the distillation is completed shall not show an acid reaction to methyl orange. (See par. 23.)

METHODS OF SAMPLING, INSPECTION, AND TESTING

13. *Detection and removal of separated water.*—Draw a portion of the solvent by means of a glass or metal container with a removable stopper or top, or with a "thief" from the lowest part of the container, or by opening the bottom valve of the perfectly level tank car. If water is found to be present, draw it all out, record the quantity, and deduct it from the total volume of liquid delivered.

14. *Sampling.*—The method of sampling given under 14a shall be used whenever feasible. When this method is not applicable, method 14b, 14c, or 14d is to be used, according to the special conditions that obtain.

14a. *While loading tank car or while filling containers for shipment.*—Samples shall be drawn by the purchaser's inspector at the discharge pipe where it enters the receiving vessel or vessels. The composite sample shall be not less than 5 gallons and shall consist of small portions of not more than 1 quart each taken at regular intervals during the entire period of loading or filling. The composite sample thus obtained shall be thoroughly mixed, and from it three samples of not less than 1 quart each shall be placed in clean, dry, glass bottles or tin cans, which must be nearly filled with the sample and securely stoppered with new, clean corks or well-fitting covers or caps. These shall be sealed and distinctly labeled by the inspector; one shall be delivered to the buyer, one to the seller, and the third held for check in case of dispute.

14b. *From loaded tank car or other large vessel.*—A composite sample of not less than 5 gallons shall be made up of numerous small samples of not more than 1 quart each taken from the top, bottom, and intermediate points by means of a metal or glass container with removable stopper or top. This device, attached to a suitable pole, is lowered to the various desired depths, when the stopper or top is removed and the container allowed to fill. The sample thus obtained is handled as in 14a.

14c. *Barrels and drums.*—Barrels and drums shall be sampled after gaging contents. Five percent of the packages in any shipment or delivery shall be represented in the sample. Thoroughly mix the contents of each barrel to be sampled by stirring with a clean rod and withdraw a portion from the center by means of a "thief" or other sampling device. The composite sample thus obtained shall be not less than 3 quarts, shall consist of equal portions of not less than $\frac{1}{2}$ pint from each package sampled, and shall be handled as in 14a. Should the inspector suspect adulteration, he shall draw the samples from the suspected packages.

14d. *Small containers, cans, etc., of 10 gallons or less.*—These should be sampled, while filling, by method 14a whenever possible, but in case this is impossible the composite sample taken shall be not less than 3 quarts. This shall be drawn from at least five packages (from

all when fewer), and in no case from less than 2 percent of the packages. The composite sample thus taken shall be thoroughly mixed and subdivided, as in 14a.

15. *Appearance*.—Examine to determine compliance with paragraph 4.

16. *Color*.—Color shall be determined by the Saybolt chromometer, ASTM¹ method D 156-38. The method of test is as follows:

16a. *The Saybolt chromometer and accessories* shall be as described in ASTM designation D 156-38, section 2.

16b. *Procedure*.—The oil tube shall be cleansed by rinsing with some of the oil² to be tested, care being taken to allow the tube to drain thoroughly. The petcock on the oil tube shall then be closed and the tube shall be filled with the oil to be tested to a depth of 12 inches. If at this depth the color of the oil is lighter than one-half disk, the one-half disk shall be used for the test. If it is darker, the oil level shall be lowered to 10.5 inches and the color compared to two disks. If the color of the oil is lighter than two disks, one disk shall be used and if darker, two disks shall be used. After determining the number of disks to be used and with the proper number in place, the level in the oil tube shall be raised if necessary until the color of the oil is decidedly darker than the color standard. The oil shall then be drawn off slowly by means of the petcock until the oil appears slightly darker than the color standard. The oil shall then be drawn down to the nearest depth corresponding to a standard color as shown in table 1. If the color of the oil observed through the eyepiece is still darker than the color standard, the oil shall be drawn down to the next depth given in table 1 and examined again. This operation shall be continued until the oil and color standard match or show questionable differences. The column of oil shall be lowered one color more and if the oil is unmistakably lighter than the color standard, the previous color shall be recorded as the Saybolt chromometer color.

The following examples of the procedure are given:

USING ONE DISK

	In.
Oil darker at depth of	16
Oil darker at depth of	14
Oil questionable at depth of	12
Oil lighter at depth of	10.75
Color is	+21

USING TWO DISKS

	In.
Oil darker at depth of	4.5
Oil darker at depth of	4.25
Oil questionable at depth of	4.0
Oil lighter at depth of	3.75
Color is	-2

¹ American Society for Testing Materials, 260 South Broad Street, Philadelphia, Pa.

² The term "oil" as used herein refers to Stoddard solvent.

TABLE 1.—*Saybolt chromometer color corresponding to depths of oil*

Number of disks	Depth of oil	Color	Number of disks	Depth of oil	Color
<i>Inches</i>					
One-half.....	20.00	+30	Two.....	6.50	+8
One-half.....	18.00	+29	Two.....	6.25	+7
One-half.....	16.00	+28	Two.....	6.00	+6
One-half.....	14.00	+27	Two.....	5.75	+5
One-half.....	12.00	+26	Two.....	5.50	+4
			Two.....	5.25	+3
One.....	20.00	+25	Two.....	5.00	+2
One.....	18.00	+24	Two.....	4.75	+1
One.....	16.00	+23	Two.....	4.50	0
One.....	14.00	+22	Two.....	4.25	-1
One.....	12.00	+21	Two.....	4.00	-2
			Two.....	3.75	-3
One.....	10.75	+20	Two.....	3.625	-4
One.....	9.50	+19	Two.....	3.50	-5
One.....	8.25	+18	Two.....	3.375	-6
One.....	7.25	+17	Two.....	3.25	-7
One.....	6.25	+16	Two.....	3.125	-8
			Two.....	3.00	-9
Two.....	10.50	+15	Two.....	2.875	-10
Two.....	9.75	+14	Two.....	2.75	-11
Two.....	9.00	+13	Two.....	2.625	-12
Two.....	8.25	+12	Two.....	2.50	-13
Two.....	7.75	+11	Two.....	2.375	-14
			Two.....	2.25	-15
Two.....	7.25	+10	Two.....	2.125	-16
Two.....	6.75	+9			

17. *Odor*.—Note whether or not the odor conforms to requirements of paragraph 6.

18. *Corrosion test at 212° F (Copper strip)*.—(Fed. Spec. VV-L-791a, method 530.31). Place a clean strip of mechanically polished pure sheet copper about $\frac{1}{2}$ inch wide and 3 inches long in a clean test tube. Add enough of the sample to be tested to cover the strip completely. Close the tube with a vented stopper and maintain for 3 hours at 212° F. Rinse the copper strip with sulfur-free acetone and compare it with a similar strip of freshly polished copper. Discoloration or pitting indicates corrosion.

19. *Doctor test as follows*:

19a. *Sodium plumbite (doctor solution)*.—Dissolve approximately 125 g of sodium hydroxide (NaOH) in 1 liter of distilled water. Add 60 g of litharge (PbO) and shake vigorously for 15 minutes or let stand with occasional shakings for at least a day. Allow to settle and decant or siphon off the clear liquid. Filtration through a mat of asbestos may be employed if the solution does not settle clear. The solution should be kept in a tightly corked bottle and should be refiltered before use if not perfectly clear.

19b. *Procedure*.—Shake vigorously together in a test tube 10 ml of the sample to be tested and 5 ml of sodium plumbite solution for about 15 seconds. Add a small pinch of pure, dry flowers of sulfur, again shake for 15 seconds, and allow to settle. Observe within a 2-minute period. The quantity of sulfur used should be such that practically all of it floats on the interface between the sample and the sodium plumbite solution.

19c. *Interpretation of results*.—If the sample is discolored, or if the yellow color of the sulfur film is noticeably masked, the test shall be reported as positive and the sample condemned as "sour." If the sample remains unchanged in color, and if the sulfur film is bright

yellow or only slightly discolored with gray or flecked with black, the test shall be reported negative and the sample considered "sweet."

20. *Sulfuric acid absorption test* as follows:

20a. *Apparatus*.—One modified Babcock bottle with ground-glass stopper, graduated to 0.2 ml (see fig. 1); one 50-ml graduated cylinder; and one 10-ml pipette standardized to agree with stoppered Babcock bottle specified above.

20b. *Babcock bottle*.—The total height of the bottle, including stopper, shall be $7\frac{3}{4}$ to 8 inches (18.7 to 20.3 cm). The bulb shall have an outside diameter of between 35 and 37 mm. The graduated portion of the neck shall have a length of $2\frac{1}{2}$ to 3 inches (63.5 to 76.2 mm). The total percent graduation shall be 100, subdivided to 2 percent. Each 10-percent line shall be longer than the 2 percent, and shall be numbered, placing the numbers at the right of the scale. The capacity of the neck for each whole percent shall be 0.10 ml. The maximum error of the total graduation or any part thereof shall not exceed one-half the volume of the least graduation (1 percent, or 0.10 ml). The 100-percent mark shall be 28 ± 1 mm from the top of the neck. The neck shall be provided with an accurately ground-glass stopper. The distance between bottom of the stopper and the uppermost graduation shall be not less than 10 mm. The stopper and bottle shall bear a corresponding serial number.

20c. *Procedure*.—Bring the temperature of the sample to $20 \pm 1^\circ$ C. Measure out 10 ml of the sample into the clean, dry modified Babcock bottle with the standard pipette and cool in ice water for 5 minutes. Add from a graduate 20 ml of cp sulfuric acid (93.2 ± 0.3 percent concentration, by titration), previously cooled in ice water for 5 minutes. The acid should be poured down the side of the bottle to prevent splashing. Again cool by allowing the bottle to stand in ice water for 10 minutes, so that the water level is above the level of the sample in the bottle. Remove the Babcock bottle from the water bath, place glass stopper previously wet with sulfuric acid in bottle

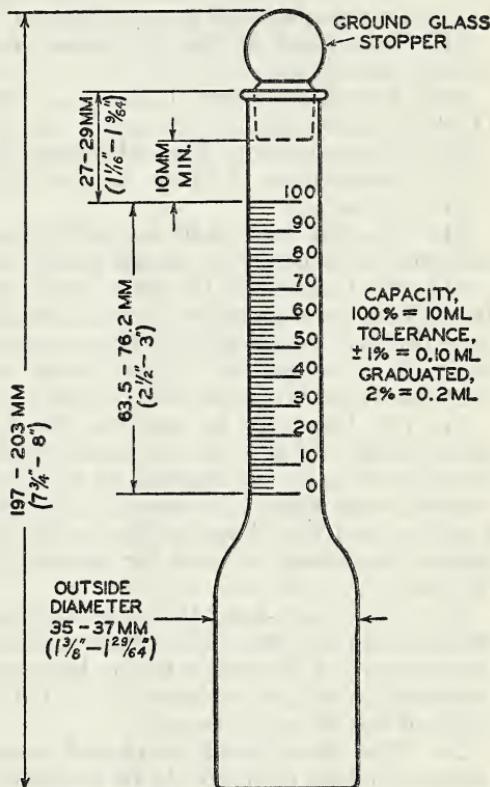


FIGURE 1.—Modified Babcock bottle for unsaturation tests.

and shake it violently for 60 ± 5 seconds. Carefully add to the bottle sufficient sulfuric acid to bring the liquid level almost to the top graduation, and allow the stoppered bottle to stand overnight (at least 12 hours is necessary). (Alternate method: a centrifuge may be used when it is desired to avoid the loss of time required for standing overnight.) Place the bottle in a water bath at $20^\circ \pm 1^\circ$ C for 15 minutes. Add sulfuric acid, previously brought to the temperature of 20° C, to bring the liquid level exactly to the top graduation. Read the scale at the lower surface of the solvent and report as percentage absorbed in sulfuric acid.

21. *Flash point by the Tag closed tester.*—(ASTM designation D 56-36), as follows:

21a. *Tag closed tester* shall be as described in ASTM designation D 56-36, section 2.

21b. *Thermometer.*—Two thermometers shall be as described in ASTM designation D 56-36, section 2b.

21c. *Procedure.*

21c (1). The test shall be performed in a room or compartment darkened sufficiently to permit ready detection of the flash.

21c (2). Care shall be taken to have the tester level and steady. It shall be surrounded on three sides by an enclosure for protection from drafts. (A shield 18 inches square and 24 inches in height, open in front, is suggested. Tests made in a laboratory hood or near ventilators are not to be relied upon.)

21c (3). Gas may be used for the test flame and for heating the water bath. If gas is not available for the test flame, a wick of cotton cord may be inserted in the burner tip, a small quantity of cotton waste placed in the oil chamber to which the burner tip is attached and the chamber filled with signal, sperm, or lard oil. An alcohol lamp may be used for heating the water bath as a substitute for gas.

21d. The water-bath thermometer shall be placed in the collar provided for it and the bath filled with water until it overflows. The temperature of the water in the bath shall be such that when testing is started it will be at least 20° F (11° C) below the probable flash point of the oil to be tested.

21e. The oil cup shall be placed in its proper position in the water bath and 50 ml of the oil to be tested shall be measured into it, using an accurate graduate or other measuring device for the purpose. The temperature of the oil shall be at least 20° F (11° C) below its probable flash point when the test is started. Air bubbles on the surface of the oil shall be destroyed, and the cover with the flash point thermometer in place shall then be properly attached to the bath collar. The test flame shall be lighted, the flame being adjusted to the size of the small white bead on the cover.

21f. The gas burner or alcohol lamp shall be centrally placed in the base of the tester and lighted. The flame shall be so adjusted that the temperature of the oil in the cup rises at the rate of 1.8° F (1° C) per minute as closely as possible, but in any case not faster than 2° F (1.1° C) nor slower than 1.6° F (0.9° C) per minute.

21g (1). The barometric pressure shall be recorded. If a barometer is not available, the figure may be obtained from the nearest Weather Bureau Station and an appropriate correction made for difference in altitude between such station and the laboratory.

21g (2). The initial temperature of the oil shall be recorded.

21g (3). When the temperature of the oil is 9° F (5° C) below its probable flash point, the knob on the cover shall be turned in such a manner as to introduce the test flame into the vapor space of the cup, and *immediately* turned back again. The time consumed in turning the knob down and back shall be about 1 full second, or the time required to pronounce distinctly the words "thousand and one."

21g (4). The time at which the first introduction of the test flame is made and the temperature of the oil shall be recorded.

21g (5). The application of the test flame shall be repeated after each 1° F (0.5° C) rise in temperature of the oil until a distinct flash in the interior of the cup is observed. The true flash must not be confused with the bluish halo which sometimes surrounds the test flame during applications immediately preceding the actual flash.

21g (6). The time and the temperature of the oil when the flash point is reached shall be recorded.

21h. *Repeat tests.*

21h (1). If the rise in temperature of the oil from the time of making the first introduction of the test flame to the time at which the flash point is observed was more rapid than 2° F (1.1° C), or slower than 1.6° F (0.9° C) per minute, the test shall be repeated, adjusting the gas burner or alcohol lamp to the proper rate of heating.

21h (2). It is not necessary to turn off the test flame with the small regulating valve on the cover; it may be left adjusted to the proper size of flame.

21h (3). After completing the preliminary test to determine the approximate flash point, the burner or lamp shall be removed, the oil cover lifted, and the thermometer bulb carefully wiped off. The oil cup shall be removed, emptied, and carefully wiped until dry.

21h (4). The temperature of the bath shall be lowered by the addition of cold water until it is 15° F (8° C) below the flash point of the oil as shown by the preliminary test.

21h (5). The oil cup shall be replaced and a fresh 50-ml sample measured into it. The test procedure, as described in paragraphs 21c (1) to 21e, inclusive, shall then be repeated, introducing the test flame for the first time, however, when the oil temperature is 10° F (5.5° C) below the flash point obtained in the preliminary test.

21h (6). Oil which has once been subjected to the flash test shall be discarded.

21h (7). If test is to be repeated, a fresh sample shall be used.

21i. *Average value of flash point.*—If two or more determinations agree within 1° F (0.5° C), the average of these results, corrected for barometric pressure, shall be considered the flash point. If two determinations do not check within 1° F (0.5° C), a third determination shall be made, and if the maximum variation of the three tests is not greater than 2° F (1° C), their average, after correcting for barometric pressure, shall be considered the flash point.

21j. *Correction for barometric pressure* shall be made only in cases of dispute or when the barometer reading varies more than $\frac{1}{2}$ inch (13 mm) from the standard pressure of 29.92 inches (760 mm). When the barometer reading is below this standard pressure, add to the thermometer reading 1.6° F (0.9° C) for each 1 inch (25 mm) of barometer difference to obtain the true flash point. When the ba-

rometer reading is above the standard pressure, deduct 1.6° F (0.9° C) for each 1 inch (25 mm) of barometer difference to obtain the true flash point.

22. *Distillation*.—(ASTM designation D 86-38), as follows:

22a. *Flask* shall be as described in ASTM designation D 86-38, section 2 (a).

22b. *Condenser* shall be as described in ASTM designation D 86-38, section 2 (b).

22c. *Shield* shall be as specified in ASTM designation D 86-38, section 2 (c).

22d. *Ring support and hard asbestos boards* shall be as described in ASTM designation D 86-38, section 2 (d).

22e. *Gas burner or electric heater* shall be as described in ASTM designation D 86-38, section 2 (e) or 2 (f).

22f. *Low-distillation thermometer* shall be as described in ASTM designation D 86-38, section 2 (g).

22g. *Graduate* shall be as described in ASTM designation D 86-38, section 2 (i).

22h. *Procedure*.

22h (1). The condenser bath shall be filled with cracked ice³ and enough water added to cover the condenser tube. The temperature shall be maintained between 32 and 40° F (0 and 4.45° C).

22h (2). The condenser tube shall be swabbed to remove any liquid remaining from the previous test. A piece of soft lint-free cloth attached to a cord or copper wire may be used for this purpose.

22h (3). 100 ml of the sample shall be measured in the 100-ml graduated cylinder at 55 to 65° F (12.8 to 18.3° C) and transferred directly to the distillation flask. None of the liquid shall be permitted to flow into the vapor tube.

22h (4). The thermometer provided with a cork shall be fitted tightly, into the flask so that it will be in the middle of the neck and so that the lower end of the capillary tube is on a level with the inside of the bottom of the vapor outlet tube at its junction with the neck of the flask. The thermometer shall be approximately at room temperature when placed in the flask.

22h (5). The charged flask shall be placed in the $1\frac{1}{4}$ inch (3.18 cm) opening in the 6 by 6 inch (15.24 by 15.24 cm) asbestos board with the vapor outlet tube inserted into the condenser tube. A tight connection may be made by means of a cork through which the vapor tube passes. The position of the flask shall be so adjusted that the vapor tube extends into the condenser tube not less than 1 inch (2.54 cm) nor more than 2 inches (5.08 cm).

22h (6). The graduated cylinder used in measuring the charge shall be placed, without drying, at the outlet of the condenser tube in such a position that the condenser tube shall extend into the graduate at least 1 inch (2.54 cm) but not below the 100-ml mark. Unless the temperature is between 55 and 65° F (12.8 and 18.3° C) the receiving graduate shall be immersed up to the 100-ml mark in a transparent bath maintained between these temperatures. The top of the graduate shall be covered closely during the distillation with a piece of blotting paper or its equivalent, cut so as to fit the condenser tube tightly.

³ Any other convenient cooling medium may be used.

22i (1). *Distillation.*—When everything is in readiness, heat shall be applied at a uniform rate, so regulated that the first drop of condensate falls from the condenser in not less than 5 nor more than 10 minutes. The distillation thermometer shall be read 2 minutes after heat is applied and the indication recorded as the "correction temperature." This figure is of significance only in cases when there is a question as to the accuracy of the initial boiling point, as subsequently determined. When the first drop falls from the end of the condenser the reading of the distillation thermometer shall be recorded as the initial boiling point. The receiving cylinder shall then be moved so that the end of the condenser tube shall touch the side of the cylinder. The heat shall then be so regulated that the distillation will proceed at a uniform rate of not less than 4 nor more than 5 ml per minute. The volume of distillate collected in the cylinder shall be observed and recorded to the nearest 0.5 ml, when the mercury of the thermometer reaches each point that is a multiple of 10° C or the Fahrenheit equivalent of this point (30, 40, 50, 60, etc., or 86, 104, 122, 140 $^{\circ}$ F, etc.). If preferred, the reading of the distillation thermometer may be observed and recorded when the level of the distillate reaches each 10-ml mark on the graduate. In case a product is being tested to ascertain whether or not it conforms with a given specification, all necessary observations shall be made and recorded, whether or not they are included in the series ordinarily employed by the laboratory making the test.

22i (2). No adjustment of the heat shall be made after the liquid residue in the flask is approximately 5 ml unless the time required to bring over the last 5 ml of distillate and reach the end point exceeds 5 minutes. The end point is the maximum temperature observed on the distillation thermometer and is usually reached after the bottom of the flask has become dry. If the bottom of the flask is not dry the operator shall record this fact.

22i (3). In case the time required to bring over the last 5 ml of distillate and reach the end point exceeds 5 minutes, the test shall be repeated and the heat shall be adjusted when the liquid residue reaches 5 ml. This adjustment may be either an increase or a decrease but must accomplish the purpose of bringing the period required to vaporize the last 5 ml of distillate and reach the end point within the limits of 3 and 5 minutes.

22i (4). The total volume of the distillate collected in the receiving graduate shall be recorded as the *recovery*.

22i (5). The cooled residue shall be poured from the flask into a small cylinder graduated in 0.1 ml, measured when cool and the volume recorded as *residue*.

22i (6). The difference between 100 ml and the sum of the recovery and the residue shall be calculated and recorded as *distillation loss*.

22i (7). The sum of the volume collected in the cylinder at any specified temperature and the distillation loss may be recorded as the percentage evaporated at the temperature in question.

22j. *Accuracy.*—With proper care and strict attention to detail, duplicate results obtained for initial boiling point and end point, respectively, should not differ from each other by more than 6° F (3.3° C). Duplicate readings of the volume of distillate collected in the cylinder when each of the prescribed temperature points is reached should not differ from each other by more than 2 ml. In case obser-

vations are made on the basis of prescribed percentage points, the differences in temperature readings should not exceed the amounts equivalent to 2 ml of distillate at each point in question.

22k. *Correction for barometric pressure.*—The actual barometric pressure shall be ascertained and recorded, but no correction shall be made except in case of dispute. In such cases the temperature points shall be corrected to 760 mm (29.92 inches), by the use of the Sydney Young equation, as follows:

For centigrade readings:

$$C_c = 0.00012 (760 - P) (273 + t_c)$$

For Fahrenheit readings:

$$C_f = 0.00012 (760 - P) (460 + t_f),$$

in which C_c and C_f are, respectively, corrections to be added to the observed temperature t_c or t_f , and P is the actual barometric pressure in millimeters of mercury.

23. *Acidity.*—This test shall be made immediately after recording the volume of residue. Transfer the cooled residue to a test tube, add three volumes of distilled water, and shake the tube thoroughly. Allow the mixture to separate and remove the aqueous layer to a clean test tube by means of a pipette. Add 1 drop of a 0.1-percent solution of methyl orange. No pink or red color shall be formed.

CERTIFICATION

24. Producers or distributors may certify conformance with the requirements of this commercial standard by means of the following statement on invoices or incorporated in labels on containers:

The ----- Company certifies this Stoddard solvent to conform with all requirements of the Commercial Standard CS3-40.

EFFECTIVE DATE

The standard is effective for new production from June 20, 1940.

STANDING COMMITTEE

The following comprises the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comment concerning the standard and suggestions for revision, may be addressed to any member of the committee or to the Division of Trade Standards, National Bureau of Standards, which acts as Secretary for the committee.

LLOYD E. JACKSON (chairman), Crandall-McKenzie and Henderson, Inc., 7021 Chaucer Street, Pittsburgh, Pa.

A. LUDLOW CLAYDEN, Sun Oil Co., Marcus Hook, Pa.

H. M. HANCOCK, The Atlantic Refining Co., 3144 Passyunk Avenue, Philadelphia, Pa.

T. H. ROGERS, Standard Oil Company of Indiana, Whiting, Ind.

C. C. HUBBARD, Hubbard Textile Bureau, "Rock Crest," Silver Spring, Md.

GEORGE P. FULTON, National Association Institute of Dyeing and Cleaning, Inc., Silver Spring, Md.

F. W. SMITHER, 403 Chemistry Building, National Bureau of Standards, Washington, D. C.

F. W. REYNOLDS, ex-officio secretary, National Bureau of Standards, Washington, D. C.

HISTORY OF PROJECT

With a view to reducing the loss of life, property damage, and other fire hazards in the dry-cleaning industry, W. J. Stoddard, of Atlanta, Ga., assisted by Lloyd E. Jackson, senior industrial fellow, of the Mundatechnical Society of America, carried out intensive studies and tests of various petroleum distillates in the laboratories of the Mellon Institute of Industrial Research, Pittsburgh, Pa., and in his dry-cleaning plant at Atlanta. As a result of this work a recommended specification for a satisfactory and comparatively safe dry-cleaning solvent was announced in May 1925.

The National Association of Dyers and Cleaners adopted the name "Stoddard solvent" for this product in view of the personal sacrifices of time and money made by President Stoddard in developing it. The National Association of Dyers and Cleaners has supported research associates at the Bureau of Standards for several years, and through this contact the bureau has assisted indirectly, if not directly, in furthering the development and use of specifications for this solvent.

At the request of the National Association of Dyers and Cleaners, the National Bureau of Standards extended its cooperation in drafting a revised specification to cover certain deficiencies in the original specification that had become apparent through purchases made under the specification, and on December 2, 1927, a general conference adopted a recommended commercial standard based on the specification with certain further modifications. The industry later accepted the standard, which became effective March 1, 1928, and was designated CS3-28.

The standard rapidly came into almost universal use by the industry and on September 13, 1933, was reaffirmed by the standing committee.

First revision.—Late in 1936, the supply of printed pamphlets became entirely exhausted. The Division of Trade Standards reported this fact to the National Association Institute of Dyeing and Cleaning before proceeding to reprint the standard in its original form. After some correspondence relative to revision, a joint meeting of the standing committee and Technical Committee D of ASTM Committee D-2 was called and a recommended revision was adopted. This recommendation of the standing committee was circulated to the industry for written acceptance on January 12, 1937. Subsequently, the National Association Institute of Dyeing and Cleaning recommended closer control over distillation range by reinsertion of a 50-percent point requirement, which had been replaced by the 90-percent point. After approval by the standing committee the amendment was presented to the industry for endorsement on June 11, 1937. The establishment of the revision was announced August 10, 1937, and the standard was issued as CS3-38, effective February 10, 1938.

Second revision.—On October 7, 1938, a supplement was issued comprising certain refinements in the test method for sulfuric acid absorption, recommended by the standing committee. The issuance of this supplement did not constitute revision of the standard, but on March 12, 1940, Technical Committee D of ASTM Committee D-2 voted

revision of the Tentative Specifications for Stoddard Solvent, ASTM Designation D 484-38T, to include in substance the recommendations covered by the supplement of October 7, 1938, with some further limitation of the concentration of the acid used in the absorption test. A refinement of the Doctor test and deletion of the paragraph on containers were also voted. The standing committee subsequently endorsed the action of Technical Committee D by letter ballot and recommended revision of CS3-38 to keep the two specifications in accord. The revision was circulated to the industry on April 19, 1940, and its establishment as CS3-40 was announced May 20, 1940.

ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this commercial standard.

Date _____

Division of Trade Standards,
National Bureau of Standards,
Washington, D. C.

Gentlemen:

Having considered the statements on the reverse side of this sheet, we accept the Commercial Standard CS3-40 as our standard of practice in the

Production ¹ Distribution ¹ Use ¹

of Stoddard solvent.

We will assist in securing its general recognition and use, and will cooperate with the standing committee to effect revisions of the standard when necessary.

Signature of individual officer _____
(in ink)

(Kindly typewrite or print the following lines)

Name and title of above officer _____

Company _____
(Fill in exactly as it should be listed)

Street address _____

City and State _____

¹ Please designate which group you represent by drawing lines through the other two. Please file separate acceptances for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade papers, colleges, etc., desiring to record their general approval, the words "in principle" should be added after the signature.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement*.—Commercial standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility*.—The purpose of commercial standards is to establish for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard, and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the commercial standard where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility*.—The major function performed by the Department of Commerce in the voluntary establishment of commercial standards on a Nation-wide basis is fourfold: First, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation*.—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

The organizations and individuals listed below have accepted this specification as their standard of practice in the production, distribution or use of Stoddard Solvent. Such endorsement does not signify that they may not find it necessary to deviate from the standard nor that producers so listed guarantee all of their products in this field to conform with the requirements of this standard. Therefore, specific evidence of quality certification should be obtained where required.

ASSOCIATIONS

Associated Factory Mutual Fire Insurance Companies, Boston, Mass.	National Association of Mutual Casualty Companies, Chicago, Ill. (In principle.)
Cleaners Purchasing Association, Inc., Chicago, Ill.	National Research Council, Ottawa, Canada. (In principle.)
Factory Insurance Association, Hartford, Conn. (In principle.)	Ohio State Association of Dyers & Cleaners, Columbus, Ohio. (In principle.)
National Association of Dyers & Cleaners, Silver Spring, Md.	Western Factory Insurance Association, Chicago, Ill.
National Association Institute Dyeing & Cleaning, Silver Spring, Md.	

FIRMS

Abbott-Hogan, Inc., Orange, N. J.	Atlas Laundry & Cleaning Co., Inc., Evansville, Ind.
Acme Laundry & Cleaners, El Paso, Tex.	Atlas Oil Corporation, Shreveport, La.
Aetna Life Affiliated Companies, Hartford, Conn.	Baird's Dry Cleaners, Boise, Idaho.
Alexander Cleaning Co., Birmingham, Ala.	Baker Cleaning Co., Tarrant, Ala.
Alma City Dry Cleaners, Alma, Mich.	Balloon Dye Works of San Diego, San Diego, Calif.
Alox Corporation, Niagara Falls, N. Y.	Barnsdall Refining Corporation, Tulsa, Okla.
Amarillo Laundry & Dry Cleaners, Inc., Amarillo, Tex.	Baxter Laundries Corporation, Grand Rapids, Mich.
American Benzol Dry Cleaning Co., The, Columbus, Ohio.	Beck Cleaners & Dyers, Inc., Rochester, N. Y.
American Cleaners, Moorhead, Minn.	Bell Co., The, Riverside, Calif.
American Dry Cleaning Co., Charlotte, N. C.	Bell Oil & Gas Co., Tulsa, Okla.
American Laundry Machinery Co., The, Norwood Station, Cincinnati, Ohio.	B & F—Model Cleaners, Portland, Oreg.
American Mineral Spirits Co., Chicago, Ill.	Better Fabrics Testing Bureau, Inc., New York, N. Y.
American Oil Co., Baltimore, Md.	Bickel's Cleaners, East Moline, Ill.
Anderson Prichard Oil Corporation, Oklahoma City, Okla.	Bigelow-Sanford Carpet Co., Inc., Thompsonville, Conn.
Antes Cleaners, St. Johns, Mich.	Billings Laundry Co., Billings, Mont.
Arcade-Sunshine Co., Inc., Washington, D. C.	Bishop Laundry Co., Rocky Mount, N. C.
Argo Oil Corporation, Detroit, Mich.	Black & Horcher, Inc., Chicago, Ill.
Arkansas Fuel Oil Co., Shreveport, La.	Blake's Dry Cleaning, Plainview, Nebr.
Arrow Cleansing-Dyeing System, Lawrence, Mass.	Blanton & Smith, Selma, Ala.
Art Dyers & Cleaners, Inc., Louisville, Ky.	Blue Bell Laundry & Dry Cleaners, Union City, Tenn.
Ashland Oil & Refining Co., Ashland, Ky.	Bob's Laundry & Dry Cleaning Co., Concord, N. C.
Atlanta Laundries, Inc., Atlanta, Ga.	Bonded Oil System, Inc., Boston, Mass.
Atlantic Refining Co., The, Philadelphia, Pa.	Boney Co., T. J., Pueblo, Colo.
	Boor's Cleanatorium, Martinsburg, W. Va.
	Borger Laundry, Borger, Tex.
	Bornot, Inc., Philadelphia, Pa.

Bosbach, Inc., Hermann, Holyoke, Mass.
 Boston Dry Cleaners, Bradford, Pa.
 Bowser & Co., Ltd., S. F., Fort Wayne, Ind.
 Brenner's Cleaning & Dye Works, San Antonio, Tex.
 Broadway Cleaners & Laundry, Council Bluffs, Iowa.
 Broadway Dyers & Cleaners, Inc., Portland, Oreg.
 BroLeen Cleaning Co., Bloomington, Ill.
 Brown Co., The R. J., St. Louis, Mo.
 Brown's, Cynthiana, Ky.
 Burkhart's Laundry & Dye Works, Houston, Tex.
 Bush & Co., Inc., New Bedford, Mass.
 Butte Laundry Co., Steubenville, Ohio.
 C. P. Chemical Solvents, Inc., The, New York, N. Y.
 Cain Cleaners, Mount Hope, Kans.
 Caled Products Co., Inc., Cottage City, Brentwood, Md. (In principle).
 California Co., The, San Francisco, Calif.
 California, State of, Sacramento, Calif.
 Canfield Oil Co., The, Cleveland, Ohio.
 Cannan Co., The, Toledo, Ohio.
 Canton Laundry & Cleaning Co., Canton, Ohio.
 Capital Laundry, Helena, Mont.
 Capital Laundry Co., Bismarck, N. Dak.
 Capital Barg Dry Cleaning Co., Cincinnati, Ohio.
 Capitol Dry Cleaning & Dyeing Co., Scranton, Pa.
 Cascade Laundry Co., Des Moines, Iowa.
 Cascade Laundry & Dry Cleaning Co., Port Arthur, Tex.
 Cash Cleaning Co., Memphis, Mo.
 Central Dry Cleaning Co., Buffalo, N. Y.
 Cery Cleaners & Dyers, Gary, Ind.
 Chalmette Oil Distributing Co., Inc., New Orleans, La.
 Charlotte Laundry, Inc., Charlotte, N. C.
 Checker Cleaners & Dyers, Chicago, Ill.
 Chehalis City Laundry, Chehalis, Wash.
 Chenoweth Dy. & Cl. Co., J. O., St. Louis, Mo.
 Cheyenne Steam Laundry & Cleaning Co., Cheyenne, Wyo.
 Cincinnati, City of, Department of Purchasing, Cincinnati, Ohio.
 Cities Service Oil Co., Refining Division, Tulsa, Okla.
 City Cleaning & Dyeing Co., Sheridan, Wyo.
 City Dye Works, Wallace, Idaho.
 City Dye Works, Bozeman, Mont.
 Clark's Laundry & Dry Cleaning Co., Mishawaka, Ind.
 Cleaners Supply House, Chicago, Ill.

College Cleaners & Dyers, Corvallis, Oreg.
 Colonial Beacon Oil Co., Boston, Mass.
 Columbus Lace Cleaning Works, Columbus, Ohio.
 Commerce Petroleum Co., Chicago, Ill.
 Conner, Frank E., Morgantown, W. Va.
 Conser Laundry, St. Joseph, Mo.
 Cooper's Cleaning Works, Rockford, Ill.
 Craighead Laundry & Cleaners, Hot Springs, Ark. (In principle).
 Crandall-McKenzie & Henderson, Inc., Pittsburgh, Pa.
 Crawford Laundry Co., The, Bridgeport, Conn.
 Crescent City Laundries, Inc., New Orleans, La.
 Crescent Laundry Co., Macon, Ga.
 Crisp Laundry & Dry Cleaning Co., Sault Ste. Marie, Mich.
 Cross Laundry Co., Martinsville, Va.
 Crown Central Petroleum Corporation, Baltimore, Md.
 Crown Laundry & Dry Cleaning Co., Indianapolis, Ind.
 Danville Laundry & Dry Cleaning Co., The, Danville, Ky.
 Davenport Cleaning Works, Sioux City, Iowa.
 Daytona Beach Laundry, Daytona Beach, Fla.
 Deep Rock Oil Corporation, Chicago, Ill.
 DeLaval Separator Co., The, Poughkeepsie, N. Y.
 DeLuxe-Imperial Dyeing & Cleaning Works, San Jose, Calif.
 Demaree, A. C., Indianapolis, Ind.
 Dengler Cleaning Works, G., Susanville, Calif.
 Derbes, George, Pottsville, Pa.
 Derby Oil Co., Wichita, Kans.
 Deuser's, Inc., Dayton, Ohio.
 Dinsmore Cleaners & Dyers, Inc., Minneapolis, Minn.
 Direct Cleaners, Inc., Upper Darby, Pa.
 Dods Cleaning and Dyeing Works, Inc., Thomas, Kansas City, Mo.
 Dorfner & Sons, Inc., Anton, Philadelphia, Pa.
 Dresher Brothers, Inc., Omaha, Nebr.
 Dreyer Dry Cleaning Co., Hannibal, Mo.
 Dudley Laundry Co., Norfolk, Nebr.
 Duke Cleaners, Lyons, Kans.
 Duke Cleaners, Burlington, Iowa.
 Dyo Chemical Corporation, Dallas, Tex.
 Eagle Dye Works Co., The, Hartford, Conn.
 East Side Cleaning Co., Kansas City, Mo.
 Eggert, E., Harrisburg, Pa.
 Eimer & Amend, New York, N. Y. (In principle.)

ElDorado Refining Co., The, ElDorado, Kans.
 Electric Cleaners, Eugene, Oreg.
 Electric Laundry Co., The, Ashtabula, Ohio.
 Elk Launderers and Cleaners, St. Paul, Minn.
 Elk Refining Co., Charleston, W. Va.
 Emery Industries, Inc., Cincinnati, Ohio.
 Empire Cleaners and Dyers, Omaha, Nebr.
 Empire Dry Cleaning Co., Inc., Charleston, W. Va.
 Empire Laundry Co., Montgomery Ala.
 Empire Oil and Refining Co., Tulsa, Okla.
 Enke's City Dye Works, Inc., Portland, Oreg.
 Etheridge Cleaners, Jackson, Miss.
 Eureka Laundry Co., Corpus Christi, Tex.
 Evans Dyeing & Cleaning, Brownwood, Tex.
 Eyre & Co., Inc., A. D., Jersey City, N. J. (In principle.)
 Fanset Dye Works, Los Angeles, Calif.
 Fashion Dry Cleaners, Inc., Indianapolis, Ind.
 Fauquier Laundry & Cleaning Co., Warrenton, Va. (In principle.)
 Fifth Avenue Cleaners & Dyers, La Grange, Ill.
 Fish Dry Cleaning Co., Baltimore, Md.
 Fishburn-Oriental Dyeing & Dry Cleaning Co., Dallas, Tex.
 Fletcher Co., Inc., W. F., Ithaca, N. Y.
 Fond du Lac Model Laundry Co., Fond du Lac, Wis.
 Forest Cleaners & Dyers, Inc., The, Detroit, Mich.
 Fort Scott Laundry and Cleaning Co., Fort Scott, Kans.
 Fowler's Valet Cleaners, Charlottesville, Va.
 Franklin Creek Refining Corporation, Franklin, Pa.
 Fray, Welch & Fray, Fort Madison, Iowa.
 Frazier's Cleaners-Hatters, Jackson, Tenn.
 Freedom Oil Works Co., The, Freedom, Pa.
 French Dyers & Cleaners, Uniontown, Pa.
 Fuel Oil and Gas Co., St. Paul, Minn.
 Fuller Cleaning & Dyeing Co., The, Cleveland, Ohio.
 Gardner Dry Cleaning Works, Gardner, Mass.
 Gardner's, Inc., Greenville, Miss.
 Garland-Cleaners-Dyers-Furriers, Roanoke, Va.
 Gaubatz Dyeing & Cleaning Co., G., St. Louis, Mo.
 General Petroleum Corporation of Calif., Los Angeles, Calif.
 Gene's Launderers-Cleaners, Arlington, Va.
 Gilmore Oil Co., Los Angeles, Calif.
 Globe Chemical Co., The, St. Bernard, Cincinnati, Ohio.
 Globe Cleaners and Dyers, Sweetwater, Tex.
 Grand Fair Lawn Cleaners, Fair Lawn, N. J.
 Golden Bell Cleaners, Inc., Malden, Mass.
 Goodwin Co., Inc., The, Connellsville, Pa.
 Grays Harbor Dye Works, Inc., Aberdeen, Wash.
 Gulf Oil Corporation, Pittsburgh, Pa.
 Gulfport Laundry & Cleaning Co., Gulfport, Miss.
 Hanford Laundry and Dry Cleaning Co., Inc., Hanford, Calif. (In principle.)
 Harvard University, Cambridge, Mass.
 Hatch Textile Research, Inc., New York, N. Y.
 Hawkeye Laundry & Dry Cleaning Co., Boone, Iowa.
 Hendersons, Inc., Johnstown, Pa.
 Hibbing Laundering & Cleaning Co., Hibbing, Minn.
 Hicks Laundry & Dry Cleaning, Danville, Ill.
 Hoff Brothers, Cleaners and Hatters, Hastings, Nebr.
 Hoffman's Cleaning Works, Oneonta, N. Y.
 Holman Laundry & Cleaning, Jim, Moberly, Mo.
 Home Laundry, The, Port Arthur, Tex.
 Home Laundry, Inc., Charlottesville, Va.
 Hosford's Dry Cleaners and Dyers, Jackson, Mich.
 Hospital Bureau of Standards & Supplies, Inc., New York, N. Y.
 Houston, Better Business Bureau of, Houston, Tex. (In principle.)
 Howards Cleaners, Inc., Cranston, R. I.
 Howell, R. F., Hamilton, Ohio.
 Hruby Cleaners, Valley City, N. Dak.
 Hubbard Textile Consulting Bureau, C. C., Silver Spring, Md.
 Hudson Cleaners, Inc., Detroit, Mich.
 Huebsch Laundry Co., Eau Claire, Wis.
 Huebsch Laundry Corporation, Milwaukee, Wis.
 Humble Oil & Refining Co., Houston, Tex.
 Humphrey Cleaning Co., Meadville, Pa.
 Hutchinson Dry Cleaning Co., G. C., Butler, Pa.
 Ideal Launderers & Dry Cleaners, McCook, Nebr.
 Ideal Laundry & Dry Cleaners, Roanoke, Va.

Ideal Laundry & Dry Cleaning Co., The, Larned, Kans.

Ideal Troy Dyers, Cleaners, Launderers, Peoria, Ill.

Independent Oil Co., Rosslyn, Va.

Independent Oil Co., The, St. Louis, Mo.

Industrial Distributors, Inc., New York, N. Y.

Insurance Co. of North America, Chicago, Ill. (In principle.)

Insurance Library of Chicago, Chicago, Ill. (In principle.)

Johnson City Steam Laundry, Inc., Johnson City, Tenn.

Johnson Laundry Co., Inc., Albert Lea, Minn.

Johnson Oil Refining Co., Chicago, Ill.

Kanotex Refining Co., The, Arkansas City, Kans.

Kean's, Inc., Baton Rouge, La.

Keep-U-Neat Cleaners, Alliance, Nebr.

Keller Bros., DuBois, Pa.

Kimble Glass Co., Vineland, N. J. (In principle.)

Kitterman's Cleaners, Cedar Rapids, Iowa.

Klamath Cleaning & Dye Works, Klamath Falls, Oreg.

Klean Klose Shop, Storm Lake, Iowa.

Kramer The Kleaner, Wabash, Ind.

Kraus & Co., Memphis, Tenn.

Kuhne Libby Co., New York, N. Y.

La Jolla Dry Cleaners, La Jolla, Calif.

Lake Side Laundry, Lake Charles, La.

LaMeasure Bros., Inc., Detroit, Mich.

Landon's Inc., Watertown, N. Y.

Langlade Laundry & Cleaners, Antigo, Wis.

Langleys, Ltd., Toronto, Canada.

Lavanderia Juarez (Juarez Laundry), Ciudad Juarez, Chihuahua, Mexico.

Lawler's Cleaners, Dyers & Furriers, Rochester, Minn.

Leary's Cleaners & Dyers, Inc., Rochester, N. Y.

Leon's Cleaners-Dyers-Launderers, Red Bank, N. J.

Lewandos French Dyeing & Cleaning Co., Watertown, Mass.

Lewis Cleaners & Dyers, Hutchinson, Kans.

Lewis Cleaning Co., Hannibal, Mo.

Lewis Dry Cleaning System, Inc., Louisville, Ky.

Lewistown Dry Cleaning & Laundry Co., Lewistown, Pa.

Liberty Cleaners, Inc., Chicago, Ill.

Lion Oil Refining Co., El Dorado, Ark.

Little, Inc., Arthur D., Cambridge, Mass. (In principle.)

Lloyd Cleaners, Inc., Atlanta, Ga.

Lobdell Bros., Chico, Calif.

Lockwood-Heath Cleaners, Inc., Elmhira, N. Y.

Loebl Dye Works, Inc., Roanoke, Va.

Long Beach, Better Business Bureau of, Ltd., Long Beach, Calif. (In principle.)

Lorenz Laundry Dyers & Cleaners, Dubuque, Iowa.

Lungstras Dyeing & Cleaning Co., St. Louis, Mo.

Macy & Co., Inc., R. H., New York, N. Y.

Madsen Cleaning Co., Provo, Utah.

Magnolia Petroleum Co., Dallas, Tex.

Marquette Steam Laundry & Dye Works, Marquette, Mich.

Marshall, F. R., Wisner, Nebr.

Marshall Cleaners, Ellsworth, Kans.

Martinu Cleaning-Dyeing Corporation, Union City, N. J.

Mayfair Cleaning Co., Cleveland Heights, Ohio.

McNerney Cleaners, Hutchinson, Kans.

Miami Laundry Co., Miami, Fla. (In principle.)

Michael, L., Amery, Wis.

Michigan Cleaners, Inc., Chicago, Ill.

Michigan Department of Agriculture, Bureau of Chemical Laboratories, Lansing, Mich. (In principle.)

Mickler's Madison, Fla. (In principle.)

Mid-Continent Petroleum Corporation, Tulsa, Okla.

Middlesboro Steam Laundry, Middlesboro, Ky.

Milady's Cleaners & Dyers, Tulsa, Okla. (In principle.)

Minnehaha Cleaners & Dyers, St. Paul, Minn.

Minnesota, State of, Oil Inspection Division, St. Paul, Minn. (In principle.)

Mitchell, Leon D. & Emma A., Sacramento, Calif.

Model Cleaning & Dyeing Co., Reading, Pa.

Model Laundry Co., Inc., Charlotte, N. C.

Modern Cleaners, Lincoln, Nebr.

Modern Dry Cleaners, Algona, Iowa.

Monkey Cleaners & Dyers, Inc., Kansas City, Mo.

Montana State College, Department of Home Economics, Bozeman, Mont. (In principle.)

Montgomery & Campbell, Inc., Rock Island, Ill.

Montgomery Ward & Co., Chicago, Ill. (In principle.)

Montpelier Steam Laundry, Montpelier, Vt.

Moon & Moon, Inc., Huntington, Ind.

Mooney Co., W. J., Pittsburgh, Pa.

Morgenthalers Cleaners & Dyers, Inc., St. Louis, Mo.

Morrison, M. J., Berlin, N. H.

Moore Expert Dry Cleaners & Laundry, Ray, Louisville, Ky.

Morristown Laundry Co., Morristown, Tenn.

Mount Desert Cleaners, Northeast Harbor, Maine.

Munro Dry Cleaning Co., Beaumont, Tex.

Murray's Dyeing & Cleaning Co., Punxsutawney, Pa.

Mutual Laundry Co., The, Topeka, Kans.

Mutual Marine Conference, Chicago, Ill. (In principle.)

National Cleaner & Dyer, The, New York, N. Y. (In principle.)

National Indemnity Exchange, St. Louis, Mo. (In principle.)

National Laundry, Gooding, and Twin Falls, Idaho.

National Petroleum Publishing Co., Cleveland, Ohio. (In principle.)

National Retailers Mutual Insurance Co., Chicago, Ill.

Nevada Cleaners, Nevada, Mo.

Nevens Co., Minneapolis, Minn.

New Britain Dry Cleaning Corporation, New Britain, Conn.

New England Carpet Cleaning Co., Inc., Greenwich, Conn.

New E & W Laundry, The, Savannah, Ga.

New Jersey, State of, State Tax Department, Trenton, N. J. (In principle.)

New Lafayette Steam Laundry, Inc., The, Lafayette, La.

New Method Cleaners, Eureka, Calif.

New Orleans, Inc., Better Business Bureau of, New Orleans, La. (In principle.)

New System Laundry, Leaksville, N. C.

New System Laundry & Dry Cleaners, Rome, N. Y.

New Way Dry Cleaning Co., York, Pa.

New Way System, Inc., Savannah, Ga.

Newerking Cleaning Fluid Co., Inc., New York, N. Y.

Nickey, Harry W., Springfield, Ill.

North Star Oil, Ltd., Winnipeg, Manitoba, Canada.

Ogden Troy Laundry & Dry Cleaning Co., Ogden, Utah.

Ohio-Curtis Co., Inc., The, Columbus, Ohio.

Oil & Gas Journal, The, Tulsa, Okla. (In principle.)

Oliverius, Frank, Watsonville, Calif.

Operadio Manufacturing Co., St. Charles, Ill.

Oriental Cleaners & Dyers, Joliet, Ill.

Osborn Cleaners, Owosso, Mich.

Page Dry Cleaning Co., Washington, D. C.

Pahnke Cleaners & Dyer, W. D., Chicago Heights, Ill.

Panhandle Refining Co., Wichita Falls, Tex.

Pantorium, The, Omaha, Nebr.

Paramount Cleaners & Dyers, Mexico, Mo.

Paris Dry Cleaning Co., South Bend, Ind.

Paris Dye & Cleaning Works, Brockway, Pa.

Parisian Dry Cleansing Co., Lynn, Mass.

Parker Cleaning & Dyeing Co., Inc., Lake Forest, Ill.

Pearson's Laundry & Dry Cleaning, Troy, Ohio.

Peerless Cleaners, Carbondale, Ill.

Peerless Cleaners & Dyers, Inc., Edwardsville, Ill.

Peerless Dry Cleaning Co., Elmira, N. Y.

Peerless Laundry & Dry Cleaning Co., The, Elyria, Ohio.

Peerless Steam Laundry, Inc., Welch, W. Va.

Penn Supreme Oil Co., Pittsburgh, Pa.

Pennsylvania Refining Co., Butler, Pa.

Pennzoil Co., The, Oil City, Pa.

Perfection Dry Cleaning Co., Inc., Binghamton, N. Y.

Perfection Laundry Co., The, Springfield, Ohio.

Peterson Co., George C., Chicago, Ill.

Petri's Master Cleaners & Dyers, North Adams, Mass. (In principle.)

Petri's Odorless Cleaners, Long Beach, Calif.

Petroleum Solvents Co., Butler, Pa.

Phillips & Jacobs, Philadelphia, Pa.

Phillips Petroleum Co., Bartlesville, Okla.

Phoenix Cleaners, Inc., Rockford, Ill.

Pico Cleaners & Dyers, Pico, Calif.

Poole Co., Guy, Asheville, N. C.

Pratt, F. E., St. Croix Falls, Wis.

Pringle Cleaners, O. G., Port Huron, Mich.

Providence Dyeing, Bleaching & Calendering Co., Providence, R. I. (In principle.)

Pullar, Robert Taft, New York, N. Y.

Pure Oil Co., Chicago, Ill.

Purkett Laundry Co., Joplin, Mo.

Puyallup Laundry & Cleaners, Puyallup, Wash.

Quality Cleaners & Dyers, Colorado Springs, Colo.

Quality Dry Cleaners of Lakeland, Inc., Lakeland, Fla.

Queen Cleaners & Dyers, Inc., Detroit, Mich.

Rae Oil Co., Inc., J. H., Rochester, N. Y.

Rainbow Dyeing & Cleaning Co., Inc., Washington, D. C.

Randalls Cleaning Plant, Hempstead, Long Island, N. Y.

Randon's Cleaners & Dyers, New Orleans, La.

Ranger Dry Cleaners, Ranger, Tex.

Rasley's, Inc., Norfolk, Nebr.

Rechtern Cleaning Co., St. Charles, Mo.

Redding Laundries, Inc., Redding, Calif.
 Redford Cleaners & Dyers, Richmond, Va.
 Refinery Supply Co., The, Tulsa, Okla.
 Regal Cleaners & Dyers, Inc., Washington, D. C.
 Republic Oil Co., Pittsburgh, Pa.
 Rice Ranch Oil Co., Santa Maria, Calif.
 Richfield Oil Corporation, Los Angeles, Calif.
 Richfield Oil Corporation of New York, New York, N. Y.
 Rinehart's Cleaners-Dyers, San Diego, Calif.
 Rio Grande Oil Co., Los Angeles, Calif.
 Ripley's (Topeka Laundry Co.), Topeka, Kans.
 Risley's Cleaners, Mt. Carmel, Ill.
 Robison & Smith, Inc., Gloversville, N. Y.
 Rollin's Cleaners-Dyers, Farmville, N. C.
 Roosevelt Oil Co., Mt. Pleasant, Mich.
 Rudie's Cleaners, St. James, Minn.
 Rudnick Cleaners, Williamstown, Mass.
 Rydahls Laundry & Cleaners, Marietta, Wis.
 Sacramento Golden State Laundry, Sacramento, Calif.
 Safandshur Chemical Co., Inc., New York, N. Y. (In principle.)
 St. Paul Dye Works, Santa Barbara, Calif.
 Sanitary Steam Laundry, Inc., Pikeville, Ky.
 Santa Fe Electric Laundry, Santa Fe, N. Mex.
 Savedge Cleaning Works, Chas. E., Richmond, Va.
 Savidusky's Inc., Madison, Wis.
 Schaffer Cleaning Works, Winona, Minn.
 Schock Independent Oil Co., Mount Joy, Pa.
 Schoen Dry Cleaning & Dye Works, Saginaw, Mich.
 Schumann & Co., Chicago, Ill.
 Schumann's, Hoopeston, Ill.
 Schwarz Laboratories, Inc., New York, N. Y. (In principle.)
 Scott Dry Cleaners, Greenville, S. C.
 Scott & Roberts, Durham, N. C.
 Scott's Cleaning Co., St. Louis, Mo.
 Sears, Roebuck & Co., Chicago, Ill.
 Seruset Co., D. H., Pittsburgh, Pa.
 Shell Oil Co., San Francisco, Calif.
 Shell Oil Co., Inc., St. Louis, Mo., and New York, N. Y.
 Shepherd Laundries Co., Beaumont, Tex.
 Sheplers', Inc., Dry Cleaners, Detroit, Mich.
 Sherwood Bros., Inc., Baltimore, Md.
 Shull's Dry Cleaning Works, York, Pa.
 Sinclair Refining Co., New York, N. Y.
 Skelly Oil Co., El Dorado, Kans.
 Smith-Cleaner, Joseph, Englewood, N. J.
 Smith Cleaning Co., The, Newark, Ohio.
 Smith's Cleaners & Dyers, New Castle, Pa.
 Socony-Vacuum Oil Co., Inc., New York, N. Y.
 Socony-Vacuum Oil Co., Inc., White Eagle Division, Kansas City, Mo.
 Sovlex Refineries, Inc., Gladewater, Tex.
 Somerset Laundry & Cleaners, Inc., Somerset, Ky. (In principle.)
 Sommerfeld's Dubuque, Iowa.
 South Penn Oil Co., Pittsburgh, Pa. (In principle.)
 South Side Dye Works, St. Louis, Mo.
 Southern Oil Service, Inc., Nashville, Tenn.
 Southern Cleaners, Ft. Worth, Tex.
 Sperry's Dry Cleaners, Fort Dodge, Iowa.
 Spiegels Cleansing Corporation, Plattsburg, N. Y.
 Spurgeon's Cleaning & Dyeing, Sacramento, Calif.
 Standard Oil Co. of California, San Francisco, Calif.
 Standard Oil Co. (Indiana), Chicago, Ill.
 Standard Oil Co., Incorporated in Kentucky, Louisville, Ky.
 Standard Oil Co. of Louisiana, New Orleans, La.
 Standard Oil Co. of New Jersey, New York, N. Y.
 Standard Oil Co. (Ohio), Cleveland, Ohio.
 Standard Oil Co. of Pennsylvania, Philadelphia, Pa.
 Standard Oil Co. of Texas, San Francisco, Calif.
 Standard Oil Company of California (Utah Corporation), San Francisco, Calif.
 Star Cleaning Co., Inc., Richmond, Va.
 Star Laundry & Dry Cleaning Co., Webster City, Iowa.
 Star Laundry Co. & Dry Cleaners, Danville, Va. (In principle.)
 Star Laundry & Dry Cleaning Co., Inc., Visalia, Calif.
 Staub & Son, Inc., Rochester, N. Y.
 Steel Co., Marshall, Oakland, Calif.
 Steinberg Oil Co., Sioux Falls, S. Dak.
 Stewart Dry Cleaning Co., Selma, Ala.
 Stillman & Van Siclen, Inc., New York, N. Y. (In principle.)
 Stoddard, Inc., Atlanta, Ga.
 Stoll Oil Refining Co., Louisville, Ky.
 Stott's Launderers & Dry Cleaners, Newark, N. Y.
 Stuebner Cleaning & Mercantile Co., St. Joseph, Mo.
 Sun Oil Co., Philadelphia, Pa.

Sunshine Laundry Co., Inc., Fredericksburg, Va.	Vallet Cleaners, Huron, S. Dak.
Superior Dry Cleaners & Dyers, Tallahassee, Fla.	Valvoline Oil Co., E. Butler, Pa.
Swiss Instaurants, Inc., Arlington, Mass.	Vermont Cleansing Co., Burlington, Vt.
Syracuse Dollar Dry Cleaning Co., Inc., Syracuse, N. Y.	Vogue Cleaners, Highland Park, Ill.
Talco Asphalt & Refining Co., Mt. Pleasant, Tex.	Wadham's Oil Co., Milwaukee, Wis.
Tarr & McComb Oil Co., Ltd., Los Angeles, Calif.	Walker, Max I., Omaha, Nebr.
Teachout Bros., Flint, Mich.	Wallis Cleaning Service, Tucson, Ariz.
Terabentine Co., Philadelphia, Pa.	Wardrobe, The, Ottumwa, Iowa.
Texas Co., The, New York, N. Y.	Warner Quinlan Co., New York, N. Y.
Textile Testing & Research Laboratories, New York, N. Y.	Warwick Dry Cleaners, Inc., Columbia, S. C.
Thiede Dry Cleaning & Dye Works, Toledo, Ohio.	Wasbers' York City Laundry Co., H., York, Pa.
3F Steam Laundry Co., Madison, Wis.	Washburn Wire Co., New York, N. Y.
Tide Water Associated Oil Co., Associated Division, San Francisco, Calif.	Washington Laundry, Spokane, Wash.
Tip Top Cleaners, Springfield, Mass. (In principle.)	Watkins & Co., E. L., Portland, Maine.
Trimack, Inc., Washington, D. C.	Wausau Laundry Co., Wausau, Wis.
Troy Dry Cleaning Co., Fort Wayne, Ind.	Waverly Oil Works Co., Pittsburgh, Pa.
Troy Laundry, Twin Falls, Idaho.	Weems Laundry Co., The, Quincy, Ill.
Troy Laundry Co., Cedar Rapids, Iowa.	Weitzel Dry Cleaning Co., Wooster, Ohio.
Troy-Pearl Laundry Co., The, Dayton, Ohio.	Welch Cleaners, Wichita, Kans.
Twin City Dry Cleaning Co., Winston-Salem, N. C.	Weller-Krouse Co., The, Sharon, Pa.
Ultra-Penn Refining Co., Butler, Pa.	Wesselmann, Inc., L. E., Buffalo, N. Y.
Underwood Superior Cleaners, Inc., West Palm Beach, Fla.	White Swan Laundry & Dry Cleaning Co., Mobile, Ala.
Union Oil Co. of California, Los Angeles, Calif.	Wichita Cleaning & Dye Works, Wichita Falls, Tex.
Unique Cleaners & Tailors, The, Alexandria, Minn.	Wilcox Oil & Gas Co., H. F., Bristow, Okla.
United Refining Co., Warren, Pa.	Winona Cleaning Works, Winona, Minn.
United States Testing Co., Inc., Hoboken, N. J.	Wisconsin Dye Works, Milwaukee, Wis.
Utah Cleaning & Dyeing Co., Salt Lake City, Utah.	Wood's Dry Cleaning, Towanda, Pa.
Utah, State of, Salt Lake City, Utah.	Worley-Bauder Cleaners, Inc., Indianapolis, Ind.
	Yackee, O. L., Stryker, Ohio.
	Yankee Cleaners, Pontiac, Ill.
	Yorgey's Cleansers & Dyers, Reading, Pa.
	Zannacker & Son, Inc., H., Manitowoc, Wis.
	Zengeler, Inc., John, Highland Park, Ill.
	Zengeler-Horan Co., Inc., Cleaners & Dyers, Lake Forest, Ill.
	Zenith-Casino, Inc., Dallas, Tex.

U. S. GOVERNMENT

Agriculture, U. S. Department of, Washington, D. C.	Treasury, U. S. Department of, Washington, D. C.
Interior Department, National Park Service, Washington, D. C.	War Department, Washington, D. C.

COMMERCIAL STANDARDS

OS No.	Item	GS No.	Item
0-40.	Commercial standards and their value to business (third edition).	49-34.	Chip board, laminated chip board, and miscellaneous boards for bookbinding purposes.
1-32.	Clinical thermometers (second edition).	50-34.	Binders board for bookbinding and other purposes.
2-30.	Mopsticks.	51-35.	Marking articles made of silver in combination gold.
3-40.	Stoddard solvent (third edition).	52-35.	Mohair pile fabrics (100-percent mohair plain velvet, 100-percent mohair plain frieze, and 50-percent mohair plain frieze).
4-29.	Staple porcelain (all-clay) plumbing fixtures.	53-35.	Colors and finishes for cast stone.
5-40.	Pipe nipples; brass, copper, steel, and wrought iron.	54-35.	Mattresses for hospitals.
6-31.	Wrought-iron pipe nipples (second edition). Superseded by CS5-40.	55-35.	Mattresses for institutions.
7-29.	Standard weight malleable iron or steel screwed unions.	56-36.	Oak flooring.
8-33.	Gage blanks (second edition).	57-40.	Book cloths, buckrams, and impregnated fabrics for bookbinding purposes except library bindings (second edition).
9-33.	Builders' template hardware (second edition).	58-36.	Woven elastic fabrics for use in overalls (overall elastic webbing).
10-29.	Brass pipe nipples. Superseded by CS5-40.	59-39.	Woven dress fabrics—testing and reporting (second edition).
11-29.	Regain of mercerized cotton yarns.	60-36.	Hardwood dimension lumber.
12-40.	Fuel oils (fifth edition).	61-37.	Wood-slat venetian blinds.
13-39.	Dress patterns (second edition).	62-38.	Colors for kitchen accessories.
14-39.	Boys' button-on waists, shirts, junior and polo shirts (made from woven fabrics) (second edition).	63-38.	Colors for bathroom accessories.
15-29.	Men's pajamas.	64-37.	Walnut veneers.
16-29.	Wall paper.	65-38.	Wool and part-wool fabrics.
17-32.	Diamond core drill fittings (second edition).	66-38.	Marking of articles made wholly or in part of platinum.
18-29.	Hickory golf shafts.	67-38.	Marking articles made of karat gold.
19-32.	Foundry patterns of wood (second edition).	68-38.	Liquid hypochlorite disinfectant, deodorant, and germicide.
20-36.	Staple vitreous china plumbing fixtures (second edition).	69-38.	Pine oil disinfectant.
21-39.	Interchangeable ground-glass joints, stop-cocks, and stoppers (fourth edition).	70-38.	Coal tar disinfectant (emulsifying type).
22-40.	Builders' hardware (nontemplate) (second edition).	71-38.	Cresylic disinfectants.
23-30.	Feldspar.	72-38.	Household insecticide (liquid spray type).
24-30.	Standard screw threads.	73-38.	Old growth Douglas fir standard stock doors.
25-30.	Special screw threads.	74-39.	Solid hardwood wall paneling.
26-30.	Aromatic red cedar closet lining.	75-39.	Automatic mechanical draft oil burners.
27-36.	Mirrors (second edition).	76-39.	Hardwood interior trim and molding.
28-32.	Cotton fabric tents, tarpaulins, and covers.	77-40.	Sanitary cast iron enameled ware.
29-31.	Staple seats for water-closet bowls.	78-39.	Ground-and-polished lenses for sun glasses.
30-31.	Colors for sanitary ware.	79-39.	Blown, drawn, and dropped lenses for sun glasses.
31-38.	Wood shingles (fourth edition).	80-41.	Electric direction signal systems other than semaphore type for commercial and other vehicles subject to special motor vehicle laws (after market).
32-31.	Cotton cloth for rubber and pyroxylin coating.	81-41.	Adverse-weather lamps for vehicles (after market).
32-32.	Knit underwear (exclusive of rayon).	82-41.	Inner-controlled spotlamps for vehicles (after market).
34-31.	Bag, case, and strap leather.	83-41.	Clearance, marker and identification lamps for vehicles (after market).
35-31.	Plywood (hardwood and eastern red cedar).	84-41.	Electric tail lamps for vehicles (after market).
36-33.	Fourdrinier wire cloth (second edition).	85-41.	Electric license-plate lamps for vehicles (after market).
37-31.	Steel bone plates and screws.	86-41.	Electric stop lamps for vehicles (after market).
38-32.	Hospital rubber sheeting.	87-41.	Red electric warning lanterns.
39-37.	Wool and part wool blankets (second edition).	88-41.	Liquid-burning flares.
40-32.	Surgeons' rubber gloves.		
41-32.	Surgeons' latex gloves.		
42-35.	Fiber insulating board (second edition).		
43-32.	Grading of sulfonated oils.		
44-32.	Apple wraps.		
45-38.	Douglas fir plywood (domestic grades) (third edition).		
46-38.	Hosiery lengths and sizes (second edition).		
47-34.	Marking of gold-filled and rolled-gold-plate articles other than watchcases.		
48-34.	Domestic burners for Pennsylvania anthracite (underfeed type).		

NOTICE.—Those interested in commercial standards with a view toward accepting them as a basis of every-day practice may secure copies of the above standards, while the supply lasts, by addressing the Division of Trade Standards, National Bureau of Standards, Washington, D. C.

